

REMARKS

SUMMARY:

The subject application sets forth claims 1-19, of which claims 1, 8 and 14 are independent claims. The detailed action dated September 16, 2004 set forth that several of original claims 1-19 are objected to for various informalities. Original claims 1-19 also stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent Application Publication US 2004/0020299 (Freakes et al.) in view of U.S. Patent No. 6,662,642 (Breed et al.). Responses to each of the characterizations outlined above, including a traversal of the prior art rejection will now be presented.

CLAIM OBJECTIONS:

Claims 1, 3, 4, 8, 10, 11, 13, 14, 16 and 17 are objected to for various informalities. The informalities pointed to in such objections are the result of inadvertent typographical errors, and such informalities are corrected in the presently submitted amendments to such claims. Based on the present amendments, Applicant respectfully requests that the claim objections set forth in the September 16, 2004 Office Action are overcome.

35 U.S.C. §103(a) REJECTION (CLAIMS 1-19):

Original claims 1-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication US 2004/0020299 (Freakes et al.) in view of U.S. Patent No. 6,662,642 (Breed et al.). Based on the following remarks, Applicant respectfully requests reconsideration of such alleged unpatentability.

Claim 1 as presently amended sets forth a sensor assembly including a substrate, a pointed projection extending from a selected location on the substrate, and a casing assembly. At least a portion of the casing assembly forms a recessed surface area capable of flexing to interface with the pointed projection. The level of flexure provided by such interface affects the electrical output signal provided from at least one acoustic wave resonator provided on the substrate.

The September 16, 2004 Office Action sets forth that Freakes et al. sets forth all

elements of claim 1 except a projection provided on and extending from a selected location on the substrate. The Examiner correctly notes that Freakes et al. fails to disclose all elements of claim 1. The Office Action attempts to cure this deficiency by citing Breed et al. and claiming that the projection 123 disclosed in such reference is the same as that set forth in claim 1 and that it would have been obvious to modify the arrangement of Freakes et al. to include such a projection.

Claim 1 as presently amended includes a pointed projection provided on the sensor substrate. Neither Freakes et al. nor Breed et al. singularly or in combination discloses such element, and thus claim 1 is not unpatentable over such references. The provision of the projection in claim 1 as a pointed element is important for effective sensor operation since a very precise alignment between the projection and the casing assembly is required to accurately detect the different possible levels of force applied to the substrate. In many SAW devices, three independent resonators and two lines of mechanical support all must be in a very precise geometric relationship (measured in microns) to the point of application of the force coming from the package lid.

Applicant further notes that it would not be obvious to modify the projection disclosed in Breed et al. to be pointed in form. The main reason such a modification would not be obvious is because the utilization of projection 123 in Breed et al. is to facilitate operation of a SAW as a wireless "switch" (see col. 30, line 66) as opposed to a "sensor" as set forth in present claim 1. The SAW switch configuration disclosed in Breed et al. is a binary device that merely detects the presence or absence of a condition or event (e.g., a person pushing the horn button on an automobile). In contrast, the sensor assembly set forth in claim 1 is used to precisely measure the magnitude of a force.

The technology disclosed in Breed et al. with respect to the switch of Figs. 8A and 8B is concerned with solving the problem of concentrating a force on a structure much larger than a SAW, like an automobile armrest or airbag cover (see col. 31, lines 2-5). Presumably in the context of mass production, these structures are mated with a SAW in an automobile assembly operation, with relatively imprecise alignment. A SAW placed under such large structures has only a fraction of a percent of the structure's

area, and hence would not receive much force unless there was a means of concentrating the force. Breed et al. envisions solving this problem by using two projections, one on the structure and one on the SAW. The projection on the structure 122 is still much larger than the SAW itself 121, so a SAW-scale projection 123 is mounted directly on the SAW 121. The force from structure 120 is concentrated on projection 122, which in turn contacts the projection 123 which lies on the SAW 121. Projection 123 is much larger than the pointed type of projection set forth in present claim 1. This relatively larger structure is sufficient to enable operation of the SAW as a switch by concentrating force anywhere generally in the middle of the SAW. Nowhere in Breed et al. is there an indication that the precise location of the application of force within the boundaries of the SAW is a concern. A precise alignment of projection and casing is imperative for effective operation of the sensor assembly of claim 1. Based on the disclosure of Breed et al., it would not be obvious to modify the projection 123 to be a pointed (thus much smaller) projection utilized for sensing a concentrated application of force in a precisely determined location.

Since all the elements set forth in present claim 1 are not disclosed singularly or in combination of the Freakes et al. and Breed et al. references, claim 1 cannot by law be unpatentable over such references. As such, Applicants respectfully submit that claim 1 is in condition for allowance and acknowledgement of the same is earnestly solicited. Furthermore, since claims 2-7 and 20 variously depend from otherwise allowable claim 1 and further limit same, claims 2-7 and 20 should also be allowable.

Present claim 8 sets forth a sensor assembly including a piezoelectric substrate with at least one acoustic wave resonator provided thereon, a projection and first and second casing portions. The projection is provided on and extends from a selected location on the piezoelectric substrate. A substantially flat indentation area is formed in the second casing portion and is provided in continuous contact with the projection. Furthermore, an electrical output signal from the at least one acoustic wave resonator element is capable of varying within a continuous range based on the level of force between the substantially flat indentation area and the projection.

Neither Freakes et al. nor Breed et al. singularly or in combination discloses a

substantially flat indentation area on a second casing portion being in continuous contact with a projection provided on the piezoelectric substrate of a sensor assembly. The provision of this particular interface in a continually contacting fashion is necessary in order to have the device function as a sensor. This sensor operation is further set forth in claim 8 to be related to the changing output signal from the at least one acoustic wave resonator element. This output signal is capable of varying within a continuous range of possible outputs depending on the level of force provided between the substantially flat indentation area and the projection. Since the cited references do not disclose such an arrangement as set forth in present claim 8, Applicant respectfully requests reconsideration of the alleged unpatentability.

Applicant further notes that it would not be obvious to modify the arrangement set forth in Breed et al. to provide the projection 123 in continuous contact with a casing portion. Such a modification would not be obvious because the utilization of projection 123 in Breed et al. is to facilitate operation of a SAW as a wireless “switch” (see col. 30, line 66) as opposed to a “sensor” as set forth in present claim 8. The SAW switch configuration disclosed in Breed et al. is a binary device that merely detects the presence or absence of a condition or event (e.g., a person pushing the horn button on an automobile or an automobile airbag deploying). In contrast, the sensor assembly set forth in claim 8 is used to precisely measure the magnitude of a force over some continuous range.

The operation of SAW 121 in Breed et al. as a switch is enabled by holding projection 123 slightly out of contact with the adjacent surface until an applied force pushes the projection and adjacent surface into contact with one another. This presence or absence of contact between such elements determines the “on” or “off” state of the wireless switch. If these elements were provided in continuous contact as set forth in present claim 8, then the switch would always be in a single state and the operation of the SAW as a switch would be destroyed. Applicant notes in accordance with § 2143.01 of the MPEP, that a proposed modification cannot render the prior art unsatisfactory for its intended purpose, nor can it change the principle of operation of a reference. As such, it would not be obvious to modify the Freakes et al. or Breed et al.

references to include the specific arrangement set forth in present claim 8.

Since all the elements set forth in present claim 8 are not disclosed singularly or in combination of the Freakes et al. and Breed et al. references, claim 8 cannot by law be unpatentable over such references. As such, Applicants respectfully submit that claim 8 is in condition for allowance and acknowledgement of the same is earnestly solicited. Furthermore, since claims 9-13 variously depend from otherwise allowable claim 1 and further limit same, claims 9-13 should also be allowable.

Present claim 14 sets forth a tire assembly including a pneumatic tire structure and a sensor assembly including a substrate with at least one acoustic wave resonator provided thereon, a projection and a casing assembly. The projection is provided on and extends from a selected location on the substrate. A recessed surface area is formed in the casing assembly and is provided in continuous contact with the projection, as well as being configured for withstanding varied levels of force between the recessed surface area and the projection.

Neither Freakes et al. nor Breed et al. singularly or in combination discloses a projection provided on a substrate and a recessed surface area formed in a casing assembly, where such elements are provided in continuous contact and are configured for withstanding varied levels of force between them. The provision of this particular interface in a continually contacting fashion is necessary in order to have the device function as a sensor. Since the cited references do not disclose such an arrangement as set forth in present claim 14, Applicant respectfully requests reconsideration of the alleged unpatentability.

Applicant further notes that it would not be obvious to modify the arrangement set forth in Breed et al. to provide the projection 123 in continuous contact with a casing portion. Such a modification would not be obvious because the utilization of projection 123 in Breed et al. is to facilitate operation of a SAW as a wireless “switch” (see col. 30, line 66) as opposed to a “sensor” as set forth in present claim 14. The SAW switch configuration disclosed in Breed et al. is a binary device that merely detects the presence or absence of a condition or event (e.g., a person pushing the horn button on an automobile or an automobile airbag deploying). In contrast, the sensor assembly set

forth in claim 14 is used to precisely measure the magnitude of a force.

The operation of SAW 121 in Breed et al. as a switch is enabled by holding projection 123 slightly out of contact with the adjacent surface until an applied force pushes the projection and adjacent surface into contact with one another. This presence or absence of contact between such elements determines the “on” or “off” state of the wireless switch. If these elements were provided in continuous contact as set forth in present claim 14, then the switch would always be in a single state and the operation of the SAW as a switch would be destroyed. Applicant notes in accordance with § 2143.01 of the MPEP, that a proposed modification cannot render the prior art unsatisfactory for its intended purpose, nor can it change the principle of operation of a reference. As such, it would not be obvious to modify the Freake et al. or Breed et al. references to include the specific arrangement set forth in present claim 14.

Since all the elements set forth in present claim 14 are not disclosed singularly or in combination of the Freake et al. and Breed et al. references, claim 14 cannot by law be unpatentable over such references. As such, Applicants respectfully submit that claim 14 is in condition for allowance and acknowledgement of the same is earnestly solicited. Furthermore, since claims 15-19 variously depend from otherwise allowable claim 14 and further limit same, claims 15-19 should also be allowable.

CONCLUSION:

In light of the foregoing amendments and for at least the reasons set forth above, Applicants respectfully submit that the present application, including claims 1-20, is in complete condition for issuance of a formal Notice of Allowance, and action to such effect is earnestly solicited. The Examiner is invited to telephone the undersigned at his

convenience should only minor issues remain after consideration of this response in order to permit early resolution of same.

Respectfully submitted,

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